IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:		§		
	Wade D. Vinson, et al.	§	Confirmation No.	7167
		§		
Serial No.:	10/783,162	§	Group Art Unit:	3746
		§		
Filed:	February 20, 2004	§	Examiner:	Dwivedi, Vikansha S.
		§		
For:	COOLING FAN FOR ELECTRONIC DEVICE	§	Atty Docket:	200400249-1 HPQB:0016

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

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December 10, 2008	**/Barry D. Blount/**
Date	Barry D. Blount

APPEAL BRIEF PURSUANT TO 37 C.F.R. §§ 41.31 AND 41.37

This Appeal Brief is being filed in furtherance to the Notice of Appeal filed on October 10, 2008.

The Commissioner is authorized to charge the requisite filing fee of $540, and any additional fees, including fees for any additional extensions of time, which may be required, to Deposit Account No. 08-2025; Order No. (200400249-1) HPQB:0016.

1. **REAL PARTY IN INTEREST**

The real party in interest is Hewlett-Packard Development Company, L.P., the Assignee of the above-referenced application by virtue of the Assignment recorded at reel 015013, frame 0181, and dated 02-20-2004. Accordingly, Hewlett-Packard Development Company, L.P. will be directly affected by the Board's decision in the pending appeal.

2. **RELATED APPEALS AND INTERFERENCES**

The Appellants are unaware of any other appeals or interferences related to this Appeal. The undersigned is the Appellants' legal representative in this Appeal.

3. **STATUS OF CLAIMS**

Claims 1-13, 16-21 and 24-34 are currently pending, are currently under final rejection and, thus, are the subject of this Appeal.

4. **STATUS OF AMENDMENTS**

No claims are amended in response to the Final Office Action and, thus, there are no outstanding amendments to be considered by the Board.

5. **SUMMARY OF CLAIMED SUBJECT MATTER**

The Application contains five independent claims, namely, claims 1, 11, 20, 25, 34 all of which are the subject of this Appeal. Each of the independent claims relate generally to a cooling fan that may be placed in series with a backup fan of the same design, wherein the airflow passes through *both* the operating fan and the unpowered fan. *See* Specification, paras. [0018]-[0019]; Fig. 2. As the airflow is passing through an unpowered fan, it is important that the unpowered fan has minimal resistance to airflow. *See id.*, para. [0027]; Fig. 2. Thus, the impeller of the unpowered fan should freely spin in the airflow stream from the powered fan, reducing resistance. *See id.*, para. [0027]. Further, the design of the blades may also lower the resistance to airflow when the fan is idle, while still producing the desirable flow characteristics when operating. *See id.*, para.

[0029]. The application also contains dependent claims 2-10, 12, 13, 16-19, 21, 24, and 26-33. The subject matter of claims 1-13, 16-21, and 24-34 is summarized below.

With regard to independent claim 1, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, an embodiment of claim 1 may relate to a cooling fan for an electronic device. *See id.*, para. [0017]; Figs. 1 and 2. The cooling fan may have a three-phase DC motor that has a stator and a rotor. *See id.*, para. [0022]; Figs. 5 and 6. The rotor may be partially made from a rare earth magnet. *See id.*, para. [0026]. Further, the cooling fan may have an impeller that includes a hub to house the three-phase DC motor and a plurality of blades extending from the hub. *See id.*, para. [0019]; Fig. 3. The impeller has an impeller diameter and each blade has a blade height that is at least 25 % of the impeller diameter. *See id.*, para. [0028].

With regard to claim 2, which depends from claim 1, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 2 each fan blade may have a chord profile that increases in chord length from a region proximate to the hub to a maximum chord length at a maximum chord length blade height. *See id.*, para. [0030]; Fig. 7.

With regard to claim 3, which depends from claim 2, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 3, the maximum chord length blade height is approximately half the blade height. *See id.*

With regard to claim 4, which depends from claim 2, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 4, each blade of the impeller

has a tip and the chord profile decreases in chord length from the maximum chord length blade height to the tip of the blade. *See id.*

With regard to claim 5, which depends from claim 2, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 5, each blade has a tip and a stagger angle of each blade increases from the hub to the tip of the blade. *See id.*, para. [0031]; Fig. 9.

With regard to claim 6, which depends from claim 5, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 6, each blade has the stagger angle of about 24 degrees to 30 degrees at the hub and the stagger angle of about 50 degrees to 56 degrees at the tip. *See id.*

With regard to claim 7, which depends from claim 2, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 7, each blade has a tip and a camber angle that decreases from the hub to the tip. *See id.*, para. [0031]; Fig. 9.

With regard to claim 8, which depends from claim 6, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 8, each blade has the camber angle of about 26 degrees to 32 degrees at the hub and about 9 degrees to 15 degrees at the tip. *See id.*

With regard to claim 9, which depends from claim 2, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 9, each impeller has solidity

of approximately one at the blade height corresponding to the maximum chord length. *See id.*, para. [0030]; Fig. 8.

With regard to claim 10, which depends from claim 1, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 10, the impeller has seven blades. *See id.*, para. [0030]; Fig. 7.

With regard to independent claim 11, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, an embodiment of claim 11 may relate to an electronic device that includes a first cooling fan. *See id.*, para. [0017]; Figs. 1 and 2. The first cooling fan may include a motor and an impeller having a hub and a plurality of blades extending from the hub to a tip. *See id.*, para. [0017]; Fig. 3. Each blade may have a chord profile that increases to a maximum chord length and decreases to a lesser chord length, a stagger angle that increases from the hub to the tip of the blade, and a camber angle that decreases from the hub to the tip. *See id.*, paras. [0030]-[0031]; Figs. 7-9. The stagger angle may increase from about 24 degrees to 30 degrees at the hub to about 50 degrees to 56 degrees at the tip. *See id.*, para. [0030]. The camber angle may decrease from about 26 degrees to 32 degrees at the hub to about 9 degrees to 15 degrees at the tip. *See id.*

With regard to claim 12, which depends from claim 11, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 12, the impeller has a solidity of approximately one at the maximum chord length. *See id.*

With regard to claim 13, which depends from claim 11, discussions of the recited features can be found at least in the below-cited locations of the specification and

drawings. By way of example, in an embodiment of claim 13, the maximum chord length is located at approximately forty percent of the full blade height. *See id.*

With regard to claim 16, which depends from claim 11, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 16, the motor is a three-phase DC motor comprising a stator and a rotor comprising a rare earth magnet. *See id.*, para. [0022]; Figs. 5 and 6.

With regard to claim 17, which depends from claim 16, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 17, the rare earth magnet comprises bonded neodymium-iron-boron. *See id.*, para. [0026].

With regard to claim 18, which depends from claim 11, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 18, a second cooling fan may be in series with the first cooling fan. *See* Specification, para. [0018]; Fig. 2. The second cooling fan includes a motor, and an impeller having a hub and a plurality of blades extending from the hub to a tip. *See id.*, para. [0019]; Fig. 3. Each blade has a chord profile that increases to a maximum chord length and decreases to a lesser chord length, a stagger angle that increases from the hub to the tip of the blade, and a camber angle that decreases from the hub to the tip. *See id.*, paras. [0030]-[0031]; Figs. 7-9. More specifically, the stagger angle may increase from about 24 degrees to 30 degrees at the hub to about 50 degrees to 56 degrees at the tip. *See id.*, para. [0031]. Further, the camber angle may decrease from about 26 degrees to 32 degrees at the hub to about 9 degrees to 15 degrees at the tip. *See id.*

With regard to claim 19, which depends from claim 11, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 19, a bearing assembly may support the impeller and allow rotation. *See id.*, para. [0025]; Fig. 6. The bearing assembly may include a number of bearings each having an outer diameter at least three times the inner diameter. *See id.*

With regard to independent claim 20, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, an embodiment of claim 20 may relate to a method of manufacturing a redundant cooling fan for an electrical device. *See id.*, para. [0017]. The method may include manufacturing each blade of the impeller to have an increasing chord profile from a base region of the blade to a maximum chord length at a specified blade height. *See id.*, para. [0030]; Fig. 7. Further, the method may include manufacturing each blade with a stagger angle that increases from the base region of the blade to a tip of each blade. *See id.*, para. [0031]. The stagger angle may be increased by about 24 degrees to 30 degrees at the base region of the blade to about 50 degrees to 56 degrees at the tip of the blade. *See id.* The method may also include manufacturing each blade with a camber angle that decreases from the base region of the blade to the tip. *See id.*, para. [0031]; Fig. 9. The camber angle may be decreased from about 26 degrees to 32 degrees at the base region of the blade to about 9 degrees to 15 degrees at the tip of the blade. *See id.*

With regard to claim 21, which depends from claim 20, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, an embodiment of claim 21 includes manufacturing each blade of the impeller to have a decreasing chord profile from the maximum chord length to a lesser chord length at the blade tip. *See id.*, para. [0030]; Fig. 7.

With regard to claim 24, which depends from claim 20, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 24, includes manufacturing the impeller with a solidity of approximately one at the maximum chord length. *See id.*, para. [0030].

With regard to independent claim 25, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, an embodiment of claim 25 may relate to a cooling fan that includes a motor, an impeller coupled to the motor, a fan housing to house the impeller, and a pair of finger guards secured to opposite sides of the fan housing. *See id.*, paras. [0019]-[0020]; Fig. 3. Each finger guard may be displaced outward relative to the fan housing. *See id.*, para. [0020]. The fan housing may include a top that extends crosswise over the pair of finger guards and overhangs the flow path outside the pair of finger guards. *See id.*, para. [0021]; Fig. 4.

With regard to claim 26, which depends from claim 25, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 26, the motor comprises a three-phase DC motor. *See id.*, para. [0030]; Fig. 3.

With regard to claim 27, which depends from claim 25, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 27, the impeller includes a hub and a plurality of blades extending from the hub to a tip. *See id.*, para. [0019]; Fig. 3. Each blade may have a chord profile that increases to a maximum chord length and may decrease to a lesser chord length, a stagger angle that may increase from the hub to the tip of the blade, and a camber angle that may decrease from the hub to the tip. *See id.*, paras. [0030]-[0031]; Figs. 7-9.

With regard to claim 28, which depends from claim 25, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 28, the impeller may have a solidity of one at the blade height corresponding to the maximum chord length. *See id.*, para. [0030].

With regard to claim 29, which depends from claim 25, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 29, the top may generally be perpendicular to the opposite sides of the fan housing. *See id.*, para. [0016]; Figs. 1 and 2.

With regard to claim 30, which depends from claim 8, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 30, each blade may have a stagger angle of approximately 29 degrees at the hub and a stagger angle of approximately 56 degrees at the tip, and each blade may have the camber angle of approximately 29 degrees at the hub and the camber angle of approximately 12 degrees at the tip. *See id.*, para. [0031].

With regard to claim 31, which depends from claim 11, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 31, the stagger angle may increase from approximately 29 degrees at the hub to approximately 56 degrees at the tip. Further, the camber angle may decrease from approximately 29 degrees at the hub to approximately 12 degrees at the tip. *See id.*

With regard to claim 32, which depends from claim 20, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, an embodiment of claim 32 includes manufacturing a three-phase DC motor comprising a stator and a rotor comprising a rare earth magnet. *See id.*, para. [0026]; Fig. 6. The stagger angle of each blade may increase from approximately 29 degrees at the base region of the blade to approximately 56 degrees at the tip of the blade. The camber angle of each blade may decrease from approximately 29 degrees at the base region of the blade to approximately 12 degrees at the tip of the blade. *See id.*, para. [0031].

With regard to claim 33, which depends from claim 25, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 33, the motor is a three-phase DC motor comprising a stator and a rotor comprising a rare earth magnet. *See id.*, para. [0026]; Figs. 5 and 6. The impeller may include a hub and a plurality of blades each extending from the hub to a tip of the respective blade. *See id.*, para. [0019]; Fig. 3. Each blade may have a stagger angle that increases from about 24 degrees to 30 degrees at the hub to about 50 degrees to 56 degrees at the tip. *See id.*, para. [0031]. Further, each blade may have a camber angle which decreases from about 26 degrees to 32 degrees at the hub to about 9 degrees to 15 degrees at the tip. *See id.*

With regard to independent claim 34, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, an embodiment of claim 34 may relate to a cooling fan for an electronic device. *See id.*, para. [0017]; Figs. 1 and 2. The cooling fan may include a three-phase DC motor comprising a stator and a rotor comprising a rare earth magnet, an impeller comprising a hub to house the three-phase DC motor, and a plurality of blades each extending from the hub to a tip of the respective blade. *See id.*, paras. [0017] and [0026]; Figs. 5 and 6. The impeller generally has an impeller diameter and each blade may have a blade height that

is at least 25 % of the impeller diameter. *See id.*, para. [0028]. A fan housing may house the impeller. *See id.*, para. [0019]; Fig. 5. A pair of finger guards may be secured to opposite sides of the fan housing, wherein each finger guard may be displaced outward relative to the fan housing. *See id.*, para. [0019]; Figs. 3 and 4. The fan housing may include a top that extends crosswise over the pair of finger guards and overhangs the flow path outside the pair of finger guards. *See id.*, para. [0019]; Fig. 4. Each blade may have a stagger angle which increases from about 24 degrees to 30 degrees at the hub to about 50 degrees to 56 degrees at the tip. *See id.*, para. [0030]. Further, each blade may have a camber angle which decreases from about 26 degrees to 32 degrees at the hub to about 9 degrees to 15 degrees at the tip. *See id.*

6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

First Ground of Rejection for Review on Appeal

The Appellants respectfully urge the Board to review and reverse the Examiner's first ground of rejection in which the Examiner rejected claim 1 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide et al. (U.S. Patent No. 5,652,470, hereinafter "Von der Heide") in view of Yokozawa et al. (U.S. Patent No. 5,650,678, hereinafter "Yokozawa") and further in view of Leupold (U.S. Patent No. 5,280,209, hereinafter "Leupold").

Second Ground of Rejection for Review on Appeal

The Appellants respectfully urge the Board to review and reverse the Examiner's second ground of rejection in which the Examiner rejected claims 2-4 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide, Yokozawa, and Leupold and further in view of Dehmer (U.S. Patent No. 1,755,633, hereinafter "Dehmer").

Third Ground of Rejection for Review on Appeal

The Appellants respectfully urge the Board to review and reverse the Examiner's third ground of rejection in which the Examiner rejected claims 5 and 6 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide, Yokozawa, and Leupold and further in view of Bradbury (U.S. Patent No. 6,129,528, hereinafter "Bradbury").

Fourth Ground of Rejection for Review on Appeal

The Appellants respectfully urge the Board to review and reverse the Examiner's fourth ground of rejection in which the Examiner rejected claims 7 and 8 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide, Yokozawa, and Leupold and further in view of Harmsen (U.S. Patent No. 5,184,938, hereinafter "Harmsen").

Fifth Ground of Rejection for Review on Appeal

The Appellants respectfully urge the Board to review and reverse the Examiner's fifth ground of rejection in which the Examiner rejected claim 10 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide, Yokozawa, and Leupold and further in view of Neely (U.S. Patent No. 5,588,804, hereinafter "Neely").

Sixth Ground of Rejection for Review on Appeal

The Appellants respectfully urge the Board to review and reverse the Examiner's sixth ground of rejection in which the Examiner rejected claims 11, 13, 16, 17, 19, 20, 21, and 30-33 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide, Yokozawa, and Leupold and further in view of Dehmer, Bradbury, and Harmsen.

Seventh Ground of Rejection for Review on Appeal

The Appellants respectfully urge the Board to review and reverse the Examiner's seventh ground of rejection in which the Examiner rejected claims 25, 26 and 29 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide, Yokozawa, and Leupold and in further view of Herbert (U.S. Patent No. 5,445,215, hereinafter "Herbert").

Eighth Ground of Rejection for Review on Appeal

The Appellants respectfully urge the Board to review and reverse the Examiner's eighth ground of rejection in which the Examiner rejected claims 9, 12 and 24 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide, Yokozawa, and Leupold and further in view of Dehmer, Bradbury, and Harmsen and further in view of Seki (U.S. Publication No. 2004/0170501, hereinafter "Seki").

Ninth Ground of Rejection for Review on Appeal

The Appellants respectfully urge the Board to review and reverse the Examiner's ninth ground of rejection in which the Examiner rejected claim 28 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide, Yokozawa, and Leupold and in further view of Herbert and further in view of Seki.

Tenth Ground of Rejection for Review on Appeal

The Appellants respectfully urge the Board to review and reverse the Examiner's tenth ground of rejection in which the Examiner rejected claim 18 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide, Yokozawa, and Leupold and further in view of Dehmer, Bradbury, and Harmsen and further in view of Horng (U.S. Patent No. D-398,978, hereinafter "Horng").

Eleventh Ground of Rejection for Review on Appeal

The Appellants respectfully urge the Board to review and reverse the Examiner's eleventh ground of rejection in which the Examiner rejected claim 34 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide, Yokozawa, and Leupold and further in view of Dehmer, Bradbury, Harmsen, Herbert and Horng.

7. ARGUMENT

As discussed in detail below, the Examiner has improperly rejected the pending claims. Further, the Examiner has misapplied long-standing and binding legal precedents and principles in rejecting the claims under 35 U.S.C. § 103(a). Accordingly, the Appellants respectfully request full and favorable consideration by the Board, as the Appellants assert that claims 1-13, 16-21, and 24-34 are currently in condition for allowance.

A. Ground of Rejection No. 1

The Appellants respectfully urge the Board to review and reverse the Examiner's first ground of rejection in which the Examiner rejected claim 1 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide in view of Yokozawa and further in view of Leupold.

Legal Precedent and Guidelines

The burden of establishing a prima facie case of obviousness falls on the Examiner. *Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (B.P.A.I. 1979). To *establish prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka, 180 U.S.P.Q.* 580 (C.C.P.A. 1974). However, it is not enough to show that all the elements exist in the prior art since a claimed invention composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. *KSR International Co.* v. *Teleflex Inc.,* 127 S.Ct. 1727, 1741 (2007). It is important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does. *Id.* Specifically, there must be some articulated reasoning with a rational underpinning to support a conclusion of obviousness; a conclusory statement will not suffice. *In* re *Kahn,* 441 F.3d 977, 988 (Fed. Cir. 2006). Indeed, the factual inquiry determining whether to combine references

must be thorough and searching, and it must be based on *objective evidence of record. In re Lee, 61* U.S.P.Q.2d 1430, 1436 (Fed. Cir. 2002).

When prior art references require a selected combination to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gained from the invention itself, i.e., something in the prior art as a whole must suggest the desirability, and thus the obviousness, of making the combination. *Uniroyal Inc.* v. *Rudkin-Wiley Corp.,* 837 F.2d 1044, 5 U.S.P.Q.2d 1434 (Fed. Cir. 1988). One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. *In re Fine,* 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). The Federal Circuit has warned that the Examiner must not, "fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher." *In re Dembiczak,* F.3d 994, 999, 50 U.S.P.Q.2d 52 (Fed. Cir. 1999) (quoting *W.L. Gore & Assoc., Inc. v. Garlock, Inc., 721* F.2d 1540, 1553,220 U.S.P.Q. 303,313 (Fed. Cir. 1983)).

The cited references, taken alone or in hypothetical combination, fail to teach or suggest features recited by independent claim 1.

Turning to the claims, amended independent claim 1 recites, *inter alia,* "an impeller comprising a hub to house the three-phase DC motor and a plurality of blades extending from the hub, wherein the impeller has an impeller diameter and *each blade has a blade height that is at least 25 % of the impeller diameter.*" (Emphasis added). The cited references, taken alone or in hypothetical combination, fail to teach or suggest each blade having a blade height of "*at least 25%* of the impeller diameter," as recited by independent claim 1.

In a previous office action, the Examiner stated that "Yokozawa et al. discloses blades and impeller where the blades are at least 25% of the impeller diameter as seen in figure 1." Office Action mailed Jan. 7, 2008, page 3. The Examiner then marked up a

copy of Fig. 1 of Yokozawa with the Examiner's interpretation of the dimensions shown in Fig. 1. *Id.* However, the Appellants note that proportions of features in drawings are not evidence of actual proportions when the drawings are not to scale. *See* M.P.E.P. § 2125. When the reference does not disclose that the drawings are to scale and is silent as to dimensions, arguments based on measurement of the drawing features are of little value. *See Hockerson-Halberstadt, Inc.* v. *Avia Group Int'l,* 222 F.3d 951, 956, 55 U.S.P.Q. 2d 1487, 1491 (Fed. Cir. 2000). Here, Yokozawa does not explicitly state that Fig. 1 is to scale nor does it mention actual dimension values. Moreover, the Appellants respectfully submit it is more reasonable than not to interpret the blade height in Yokozawa as being consistent with the 20% of impeller diameter value disclosed in the Appellants' specification as being the typical blade height in conventional DC motors. *See* Application, paragraph [0028]. Thus, Fig. 1 of Yokozawa does not teach a blade height of at least 25% of the impeller diameter.

In response to this argument, the Examiner relied on M.P.E.P. § 2125, stating that "the description of the article pictured can be relied on, in combination with the drawings, for what they would reasonably teach on of ordinary skill in the art (See M.P.E.P. § 2125)." Final Office Action, p.15. Respectfully, the Examiner has taken the statement cited from M.P.E.P. § 2125 completely out of context. Apparently, the Examiner believes, in direct contradiction to M.P.E.P. § 2125, that relative dimensions as measured from a figure may be used to determine part dimensions in the prior art. However, M.P.E.P. § 2125 clearly states, *inter alia*:

> **PROPORTIONS OF FEATURES IN A DRAWING ARE NOT EVIDENCE OF ACTUAL PROPORTIONS WHEN DRAWINGS ARE NOT TO SCALE**
>
> When the reference does not disclose that the drawings are to scale and is silent as to dimensions, arguments based on measurement of the drawing features

> are of little value. See *Hockerson-Halberstadt, Inc. v. Avia Group Int'l*, 222 F.3d 951, 956, 55 USPQ2d 1487, 1491 (Fed. Cir. 2000) (*The disclosure gave no indication that the drawings were drawn to scale. "[I]t is well established that patent drawings do not define the precise proportions of* the elements and may not be relied on to show particular sizes if the specification is completely silent on the issue."). However, the description of the article pictured can be relied on, in combination with the drawings, for what they would reasonably teach one of ordinary skill in the art. *In re Wright,* 569 F.2d 1124, 193 USPQ 332 (CCPA 1977) ("*We disagree with the Solicitor's conclusion, reached by a comparison of the relative dimensions of appellant's and Bauer's drawing figures, that Bauer 'clearly points to the use of a chime length of roughly 1/2 to 1 inch for a whiskey barrel.' This ignores the fact that Bauer does not disclose that his drawings are to scale. ..* However, we agree with the Solicitor that *Bauer's* teaching that whiskey losses are influenced by the distance the liquor needs to 'traverse the pores of the wood' (albeit in reference to the thickness of the barrelhead)" would have suggested the desirability of an increased chime length to one of ordinary skill in the art bent on further reducing whiskey losses." 569 F.2d at 1127, 193 USPQ at 335-36.)

(Emphasis added). Moreover, even the case relevant to the quote cited by the Examiner clearly points out that relative measurements from drawings are not useful in the absence of the teaching of the importance of these measurements. The Appellants respectfully note that, as previously stated, Yokozawa does not provide dimensions in the drawing cited, and does not discuss dimensions of the impeller blades in the text. Further, Yokozawa does not provide any guidance for increasing the impeller size. Accordingly, Fig. 1 of Yokozawa does not teach a blade height of at least 25% of the impeller diameter.

None of the secondary references cited obviates the deficiencies of Yokozawa, either alone or in hypothetical combinations. In view of these deficiencies among others,

the cited references, taken cannot render obvious the current independent claim 1 and its dependent claims 2-10. Accordingly, reversal of this rejection is respectfully requested.

B. **Ground of Rejection No. 2:**

The Appellants respectfully urge the Board to review and reverse the Examiner's second ground of rejection in which the Examiner rejected claims 2-4 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide, Yokozawa and Leupold and further in view of Dehmer. The Appellants note that claims 2-4 depend from claim 1, and respectfully assert that these claims are allowable over the cited references for at least the reasons stated above with respect to the first grounds of rejection. Reversal of this rejection is therefore respectfully requested.

C. **Ground of Rejection No. 3 :**

The Appellants respectfully urge the Board to review and reverse the Examiner's third ground of rejection in which the Examiner rejected claims 5 and 6 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide, Yokozawa, and Leupold and further in view of Bradbury. The Appellants note that claims 5 and 6 depend from claim 1, and respectfully assert that these claims are allowable over the cited references for at least the reasons stated above with respect to the first grounds of rejection.

Furthermore, claim 6 recites that "each blade has the stagger angle of about 24 degrees to 30 degrees at the hub and the stagger angle of about 50 degrees to 56 degrees at the tip." Von der Heide, Yokozawa, and Leupold are entirely silent on the issue of stagger angle. In fact, the Examiner has apparently relied exclusively on Bradbury as the one reference which discloses the concept of a stagger angle. However, Bradbury only discloses one specific dimensional value for stagger angle at the hub and tip of a blade in claim 12 and Fig. 20. In each of these locations in Bradbury, the stagger angle is characterized as increasing from a value of 41.8 degrees at the hub of a blade to a value of 65.7 degrees at the tip of a blade. There is no mention of stagger angle ranges at either

the root or the tip, only discrete values are disclosed. In addition, neither of these discrete values fall within the ranges claimed in independent claims 11 and 20. For instance, 41.8 degrees at the hub does not fall within or even near the range of 24-30 degrees as claimed and 65.7 degrees at the tip does not fall within or even near the range of 50-56 degrees as claimed. Thus, for at least this additional reason, dependent claim 6 is allowable over the references cited. Reversal of this rejection is therefore respectfully requested.

D. **Ground of Rejection No. 4 :**

The Appellants respectfully urge the Board to review and reverse the Examiner's fourth ground of rejection in which the Examiner rejected claims 7 and 8 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide, Yokozawa, and Leupold and further in view of Harmsen. The Appellants respectfully note that claims 7 and 8 depend from claim 1 and assert that these claims are allowable over the cited references for at least the reasons stated above with respect to the first grounds of rejection.

Furthermore, claim 8 recites "each blade has the camber angle of about 26 degrees to 32 degrees at the hub and about 9 degrees to 15 degrees at the tip." With respect to claim 8, the Examiner stated:

> Von der Heide, Yokozawa in view of Leupold and further in view of Harmsen teaches the invention except claimed range, however it fails to patentably distinguish over Von der Heide, Yokozawa in view of Leupold and further in view of Harmsen and would have been within the level of one of ordinary skill in the art at the time the invention was made. It has been held that "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233,235 (CCPA 1955), MPEP 2144.05 ll.

Final Office Action, page 6.

However, the Appellants contend that the situation discussed in M.P.E.P. § 2144.05 II and *In re Aller* is quite different and, therefore, inapposite. For instance, in *In re Aller,* the prior art reference showed essentially the same chemical process as the recited claims except that the experiment in the prior art reference was conducted at a temperature of 100° C and with a 10% sulphuric acid solution while the claims recited a 25-70% sulphuric acid solution at temperatures of 40-80° C. *See In re Aller,* 105 U.S.P.Q. at 234. Therefore, in that situation, the prior art reference disclosed workable values. In contrast, in the present situation, the prior art reference discloses only that the camber angle "decreases at an increasing distance from the hub 11." *See* Harmsen, column 3, lines 32-34. This passage encompasses the entire extent of the disclosure regarding camber angles in Harmsen. Therefore, Harmsen gives no guidance as to what might be appropriate camber angles at the hub or the tip of the blade. It cannot be true that by making such a broad statement, Harmsen has captured the entirety of workable camber angle ranges.

In fact, Section 2144.05 of the Manual of Patent Examining Procedure specifically states:

> However, if the reference's disclosed range is so broad as to encompass a very large number of possible distinct compositions, this might present a situation analogous to the obviousness of a species when the prior art broadly discloses a genus. *Id.* See also *In re Baird,* 16 F.3d 380, 29 USPQ2d 1550 (Fed. Cir. 1994); *In re Jones,* 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992); MPEP § 2144.08.

M.P.E.P. § 2144.05(1).

The Appellants contend that in the present situation, by encompassing all of the workable camber angle ranges, the passage made in Harmsen may, at most, be interpreted as claiming a genus whereas dependent claim 8 claims a species. The fact that a claimed species or subgenus is encompassed by a prior art genus is not sufficient by itself to establish a *prima facie* case of obviousness. *In re Baird,* 16 F.3d at 382, 9 U.S.P.Q.2d at

1552 ("The fact that a claimed compound may be encompassed by a disclosed generic formula does not by itself render that compound obvious."). Therefore, the conclusory statement that it "would have been within the level of one of ordinary skill in the art at the time the invention was made" to use the claimed ranges for stagger and camber angles is insufficient to support a *prima facie* case of obviousness with respect to dependent claim 8.

As none of the other cited references mentions camber angle, they cannot obviate the deficiencies of Harmsen. Accordingly, the Appellants respectfully assert that dependent claim 8 is allowable over the cited references for at least this additional reason. The Appellants respectfully request the Board to reverse this rejection.

E. **Ground of Rejection No. 5 :**

The Appellants respectfully urge the Board to review and reverse the Examiner's fifth ground of rejection in which the Examiner rejected claim 10 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide, Yokozawa, and Leupold and further in view of Neely. The Appellants note that claim 10 depends from claim 1 and respectfully assert that this claims is allowable over the cited references for at least the reasons stated above with respect to the first grounds of rejection. Reversal of this rejection is respectfully requested.

F. **Ground of Rejection No. 6:**

The Appellants respectfully urge the Board to review and reverse the Examiner's sixth ground of rejection in which the Examiner rejected claims 11, 13, 16, 17, 19, 20, 21, and 30-33 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide, Yokozawa, Leupold and further in view of Dehmer, Bradbury, and Harmsen. The Appellants respectfully traverse this rejection. As a preliminary matter, the Appellants note that claim 33 depends from claim 25. Accordingly, the Appellants have chosen to discuss this claim with claim 25 under the seventh ground of rejection.

The cited references, taken alone or in hypothetical combination, fail to teach or suggest features recited by independent claims 11 and 20.

Independent claim 11 recites, *inter alia*:

> The stagger angle increases from about 24 degrees to 30 degrees at the hub to about 50 degrees to 56 degrees at the tip; or the camber angle decreases from about 26 degrees to 32 degrees at the hub to about 9 degrees to 15 degrees at the tip; or a combination thereof.

Similarly, independent claim 20 recites, *inter alia*:

> The stagger angle increases from about 24 degrees to 30 degrees at the base region of the blade to about 50 degrees to 56 degrees at the tip of the blade; or the camber angle decreases from about 26 degrees to 32 degrees at the base region of the blade to about 9 degrees to 15 degrees at the tip of the blade; or a combination thereof.

As discussed with respect to the third ground of rejection, the cited references, taken alone or in hypothetical combination, fail to teach or suggest each blade having stagger angles which fall within the specific ranges recited in independent claims 11 and 20. Accordingly, for at least the same reasons, the cited references do not make obvious independent claims 11 and 20, which recite the same ranges.

Furthermore, as discussed with respect to the fourth ground of rejection, the cited references, taken alone or in hypothetical combination, fail to teach or suggest each blade having camber angles which fall within the specific ranges recited in independent claims 11 and 20. Accordingly, for at least the same reasons, the cited references do not make obvious independent claims 11 and 20, which recite the same ranges.

In view of these deficiencies among others, the cited references, taken alone or in hypothetical combination, cannot render obvious the current independent claims 11 and

20 and their dependent claims 13, 16, 17, 19, 21, and 30-32. Reversal of this rejection is therefore respectfully requested.

G. **Ground of Rejection No. 7 :**

The Appellants respectfully urge the Board to review and reverse the Examiner's seventh ground of rejection in which the Examiner rejected claims 25, 26 and 29 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide, Yokozawa, and Leupold and further in view of Herbert. The Appellants respectfully traverse this rejection. As noted above, the Appellants have chosen to discuss claim 33, which depends from claim 25, with claim 25. Further, the Appellants respectfully note that the Examiner did not mention claim 27 in the Final Office Action. Accordingly, claim 27, which depends from claim 25, will also be discussed with claim 25.

The cited references, taken alone or in hypothetical combination, fail to teach or suggest features recited by independent claim 25.

Amended independent claim 25 recites, *inter alia,* "the fan housing comprises a top that extends *crosswise* over the pair of finger guards and *overhangs* the flow path outside the pair of finger guards." The cited references, taken alone or in hypothetical combination, fail to teach or suggest the foregoing features of independent claim 25.

In rejecting independent claim 25 under 35 U.S.C. § 103, the Examiner failed to address how the cited references teach or suggest an overhanging top piece of the fan housing. Moreover, the Appellants find no mention of such an overhanging top piece of the fan housing in any of the cited references. Although the Appellants do not intend or suggest that the specification should be read into the claims, the Appellants submit that the specification and figures clearly support the present claim language. For example, the Appellants' specification discloses:

> As illustrated in FIG. 4, a gap 90 is provided between the impellers 72 of the two fans to enable the air 58 to stabilize before it enters the second fan 46, reducing air resistance

> further. As noted above, the amount of audible noise generated is reduced by reducing the resistance to air flow. *The top 88 of each fan housing 70 has an overhang 92 that covers the gap 90 between the first fan 44 and the second fan 46 to prevent air from being diverted into the server 20, rather than to the second fan 46.* Preferably, the impeller 72 of the idle fan is able to spin freely. The resistance to the flow of air of a non-operating fan is greater when the impeller 72 is locked than it is when the impeller 72 is able to spin freely.

See Application, FIG. 4; paragraph [0020] (emphasis added). Again, the cited references are clearly missing the "the fan housing comprises a top that extends crosswise over the pair of finger guards and *overhangs* the flow path *outside* the pair of finger guards," as recited by claim 25 and clearly illustrated in Fig. 4. In view of these deficiencies among others, the cited references, taken alone or in hypothetical combination, cannot render obvious the current independent claim 25 and its dependent claims.

In view of these deficiencies among others, the cited references, taken alone or in hypothetical combination, cannot render obvious independent claims 25 and its dependent claims 26, 27, and 29. Accordingly, the Appellants respectfully request reversal of this rejection.

H. **Ground of Rejection No. 8:**

The Appellants respectfully urge the Board to review and reverse the Examiner's eighth ground of rejection in which the Examiner rejected claims 9, 12 and 24 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide, Yokozawa, and Leupold further in view of Dehmer, Bradbury, and Harmsen and further in view of Seki. The Appellants note that claim 9 depends from claim 1 and is allowable for at least the same reasons as discussed in the first ground of rejection, as Seki does not obviate the deficiencies of the references cited therein. Claims 12 and 24 depend from claims 11 and

20 and are allowable for at least the same reasons as discussed in the sixth ground of rejection, as Seki does not obviate the deficiencies of the references cited therein.

Furthermore, the solidity recited in claims 9, 12, and 24 is calculated as "the ratio of the *chord length* to the *spacing ("S")* between the blades." *See* Specification, para. [0029] (emphasis added); Figs. 7 and 8. In contrast, the term "solidity" as used in Seki, is calculated by the equation *N*C/R*, where *N is the number* of two dimension blades, *C is the "cord length,"* and *R is the radius* from the axis to the center of a two-dimensional blade. *See* Seki, para. [0013]; Fig. 1. This term has very little in common with the term solidity as recited in claims 9, 12, and 24 and, thus, any numerical similarity between the results calculated by these different methods is meaningless. Indeed, if the solidity of the apparatus in the Seki application were to be calculated using the method described in the present application, the numbers would be much lower than 1, given the very large spacing between the blades. Thus, the "solidity" term used by Seki does not make the present claims obvious. Further, none of the other references cited, either alone or in any hypothetical combination, obviates the deficiencies of Seki. Accordingly, for at least this additional reason, claims 9, 12, and 24 are allowable over the cited references. Reversal of this rejection is respectfully requested.

I. **Ground of Rejection No. 9:**

The Appellants respectfully urge the Board to review and reverse the Examiner's ninth ground of rejection in which the Examiner rejected claim 28 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide, Yokozawa, and Leupold and further in view of Herbert and Seki. As claim 28 depends from claim 25, the Appellants respectfully assert that it is allowable for the same reasons as discussed with respect to the seventh ground of rejection.

Further, the Appellants respectfully assert that the solidity term recited in claim 28 has nothing in common with the "solidity" term used in Seki, as discussed with

respect to the ninth ground of rejection. As none of the other references cited by the Examiner mention solidity and, thus, do not obviate the deficiencies of Seki, the Appellants respectfully assert that claim 28 is allowable over Seki for at least this additional reason. The Appellants respectfully request reversal of this rejection.

J. **Ground of Rejection No. 10:**

The Appellants respectfully urge the Board to review and reverse the Examiner's tenth ground of rejection in which the Examiner rejected claim 18 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide, Yokozawa, and Leupold and further in view of Dehmer, Bradbury, and Harmsen and further in view of Horng. The Appellants respectfully assert that Horng does not obviate the deficiencies of the other references cited. Therefore, as claim 18 depends from claim 11, it is allowable for the same reasons discussed in the sixth ground of rejection.

Furthermore, claim 18 recites "a second cooling fan *in series* with the first cooling fan." (Emphasis added). In this context, "in series" indicates that the airflow from the first fan directly passes through the second fan. This is clearly described in the specification, which states, *inter alia*, that "depending upon which of the two fans is operating, either the first fan 44 is blowing air 58 *through* the second fan 46 or the second fan 46 is drawing air 58 *through* the first fan 46." *See* Specification, para. [0018] (emphasis added). This is further illustrated in Fig. 2, which shows the airflow through the fans.

In contrast, Horng clearly shows the two fans are *parallel* to each other. *See* Horng, Figs.1, 2, 8, and 9. The *parallel* arrangement of Horng does not make a *series* arrangement obvious. None of the other references cited discuss a *series* configuration of fans and, thus, do not obviate the deficiencies of Horng. Accordingly, for at least this additional reason, the Appellants assert that claim 18 is allowable over the cited references. Reversal of this rejection is therefore respectfully requested.

K. **Ground of Rejection No. 11:**

The Appellants respectfully urge the Board to review and reverse the Examiner's eleventh ground of rejection in which the Examiner rejected claim 34 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide, Yokozawa, and Leupold and further in view of Dehmer, Bradbury, Harmsen, Herbert and Horng.

Independent claim 34 recites, *inter alia*, that "each blade has a blade height that is at least 25 % of the impeller diameter." As discussed above with respect to the first ground of rejection, none of the cited references, alone or in any hypothetical combination, makes this obvious.

Further, claim 34 recites, *inter alia*, that "the fan housing comprises a top that extends crosswise over the pair of finger guards and overhangs the flow path outside the pair of finger guards." As discussed above with respect to the seventh ground of rejection, none of the cited references, alone or in any hypothetical combination, makes this obvious.

Finally, claim 34 recites, *inter alia*, that

> Each blade has a stagger angle which increases from about 24 degrees to 30 degrees at the hub to about 50 degrees to 56 degrees at the tip, or each blade has a camber angle which decreases from about 26 degrees to 32 degrees at the hub to about 9 degrees to 15 degrees at the tip, or a combination thereof.

As discussed above with respect to the fourth and sixth grounds of rejection, none of the cited references, alone or in any hypothetical combination, makes this obvious.

As a final observation on the rejections discussed in grounds one through eleven, above, the Appellants respectfully note that the Examiner's rejections appear to be based

on hindsight reconstruction. More specifically, the Examiner appears to be picking and choosing among various prior art references without regard to the requisite obviousness of making such combinations, e.g., as indicated by the references themselves. Instead, the Examiner appears to be using the Appellants' disclosure and claims as a guide for hindsight reconstruction of the present claims. This hindsight reconstruction is clearly improper and cannot be used to formulate rejections under 35 U.S.C. § 103.

As discussed above, when prior art references require a selected combination to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gained from the invention itself, i.e., something in the prior art as a whole must suggest the desirability, and thus the obviousness, of making the combination. *Uniroyal Inc.* v. *Rudkin-Wiley Corp.,* 837 F.2d 1044, 5 U.S.P.Q.2d 1434 (Fed. Cir. 1988). One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. *In re Fine, 837* F.2d 1071,5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). The Federal Circuit has warned that the Examiner must not, "fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher." *In re Dembiczak,* F.3d 994, 999, 50 U.S.P.Q.2d 52 (Fed. Cir. 1999) (quoting *W.L. Gore & Assoc., Inc.* v. *Garlock, Inc.,* 721 F.2d 1540, 1553,220 U.S.P.Q. 303, 313 (Fed. Cir. 1983). For at least this additional reason, the Appellants respectfully stress that the present rejections are based on improper hindsight reconstruction and should be overruled.

For at least the reasons discussed above, the Appellants assert that the references cited, alone or in any sort of hypothetical combination, cannot make claims 1-13, 16-21 and 24-34 obvious. Therefore, the Appellants respectfully request that the Board overrule the Examiner's rejections of these claims. Accordingly, the Appellants respectfully request reversal of this rejection.

Conclusion

The Appellants respectfully submit that all pending claims are in condition for allowance. However, if the Examiner or Board wishes to resolve any other issues by way of a telephone conference, the Examiner or Board is kindly invited to contact the undersigned attorney at the telephone number indicated below.

Respectfully submitted,

Date: December 10, 2008

/Barry D. Blount/
Barry D. Blount
Reg. No. 35,069
International IP Law Group
P.O. Box 691927
Houston, TX 77269-1927
(832) 375-0200

CORRESPONDENCE ADDRESS:
HEWLETT-PACKARD COMPANY
Intellectual Property Administration
P.O. Box 272400
Fort Collins, Colorado 80527-2400

8. APPENDIX OF CLAIMS ON APPEAL

Listing of Claims:

1. A cooling fan for an electronic device, comprising:

a three-phase DC motor comprising a stator and a rotor comprising a rare earth magnet; and

an impeller comprising a hub to house the three-phase DC motor and a plurality of blades extending from the hub, wherein the impeller has an impeller diameter and each blade has a blade height that is at least 25 % of the impeller diameter.

2. The cooling fan as recited in clain1 1, wherein each blade has a chord profile that increases in chord length from a region proximate to the hub to a maximum chord length at a maximum chord length blade height.

3. The cooling fan as recited in claim 2, wherein the maximum chord length blade height is approximately half the blade height.

4. The cooling fan as recited in claim 2, wherein each blade of the impeller has a tip and the chord profile decreases in chord length from the maximum chord length blade height to the tip of the blade.

5. The cooling fan as recited in claim 2, wherein each blade has a tip and a stagger angle of each blade increases from the hub to the tip of the blade.

6. The cooling fan as recited in claim 5, wherein each blade has the stagger angle of about 24 degrees to 30 degrees at the hub and the stagger angle of about 50 degrees to 56 degrees at the tip.

7. The cooling fan as recited in claim 2, wherein each blade has a tip and a camber angle that decreases from the hub to the tip.

8. The cooling fan as recited in claim 6, wherein each blade has the camber angle of about 26 degrees to 32 degrees at the hub and about 9 degrees to 15 degrees at the tip.

9. The cooling fan as recited in claim 2, wherein each impeller has solidity of approximately one at the blade height corresponding to the maximum chord length.

10. The cooling fan as recited in claim 1, wherein the impeller has seven blades.

11. An electronic device, comprising:

a first cooling fan, comprising:

a motor; and

an impeller having a hub and a plurality of blades extending from the hub to a tip, wherein each blade has a chord profile that increases to a maximum chord length and decreases to a lesser chord length, a stagger angle that increases from the hub to the tip of the blade, and a camber angle that decreases from the hub to the tip;

wherein:

the stagger angle increases from about 24 degrees to 30 degrees at the hub to about 50 degrees to 56 degrees at the tip; or

the camber angle decreases from about 26 degrees to 32 degrees at the hub to about 9 degrees to 15 degrees at the tip;

or a combination thereof.

12. The electronic device as recited in claim 11, wherein the impeller has a solidity of approximately one at the maximum chord length.

13. The electronic device as recited in claim 11, wherein the maximum chord length is located at approximately forty percent of the full blade height.

16. The electronic device as recited in claim 11, wherein the motor is a three-phase DC motor comprising a stator and a rotor comprising a rare earth magnet.

17. The electronic device as recited in claim 16, wherein the rare earth magnet comprises bonded neodymium-iron-boron.

18. The electronic device as recited in claim 11, comprising:

a second cooling fan in series with the first cooling fan, the second cooling fan comprising:

a motor; and

an impeller having a hub and a plurality of blades extending from the hub to a tip,

wherein each blade has a chord profile that increases to a maximum chord length and decreases to a lesser chord length, a stagger angle that increases from the hub to the tip of the blade, and a camber angle that decreases from the hub to the tip;

wherein:

the stagger angle increases from about 24 degrees to 30 degrees at the hub to about 50 degrees to 56 degrees at the tip; or

the camber angle decreases from about 26 degrees to 32 degrees at the hub to about 9 degrees to 15 degrees at the tip;

or a combination thereof.

19. The electronic device as recited in claim 11, comprising a bearing assembly operable to rotatably support the impeller, wherein the bearing assembly comprises a plurality of bearings each having an outer diameter at least three times the inner diameter.

20. A method of manufacturing a redundant cooling fan for an electrical device, comprising;

manufacturing each blade of the impeller to have an increasing chord profile from a base region of the blade to a maximum chord length at a specified blade height;

manufacturing each blade with a stagger angle that increases from the base region of the blade to a tip of each blade; and

manufacturing each blade with a camber angle that decreases from the base region of the blade to the tip;

wherein:

the stagger angle increases from about 24 degrees to 30 degrees at the base region of the blade to about 50 degrees to 56 degrees at the tip of the blade; or

the camber angle decreases from about 26 degrees to 32 degrees at the base region of the blade to about 9 degrees to 15 degrees at the tip of the blade; or

a combination thereof.

21. The method as recited in claim 20, comprising manufacturing each blade of the impeller to have a decreasing chord profile from the maximum chord length to a lesser chord length at the blade tip.

24. The method as recited in claim 20, comprising manufacturing the impeller with a solidity of approximately one at the maximum chord length.

25. A cooling fan comprising:

a motor;

an impeller coupled to the motor;

a fan housing to house the impeller; and

a pair of finger guards secured to opposite sides of the fan housing, each finger guard being displaced outward relative to the fan housing,

wherein the fan housing comprises a top that extends crosswise over the pair of finger guards and overhangs the flow path outside the pair of finger guards.

26. The cooling fan as recited in claim 25, wherein the motor comprises a three-phase DC motor.

27. The cooling fan as recited in claim 25, wherein the impeller comprises a hub and a plurality of blades extending from the hub to a tip, wherein each blade has a chord profile that increases to a maximum chord length and decreases to a lesser chord length, a stagger angle that increases from the hub to the tip of the blade, and a camber angle that decreases from the hub to the tip.

28. The cooling fan as recited in claim 25, wherein the impeller has a solidity of one at the blade height corresponding to the maximum chord length.

29. The cooling fan as recited in claim 25, wherein the top is generally perpendicular to the opposite sides of the fan housing.

30. The cooling fan as recited in claim 8, wherein each blade has the stagger angle of approximately 29 degrees at the hub and the stagger angle of approximately 56 degrees at the tip, and each blade has the camber angle of approximately 29 degrees at the hub and the camber angle of approximately 12 degrees at the tip.

31. The electronic device as recited in claim 11, wherein the stagger angle increases from approximately 29 degrees at the hub to approximately 56 degrees at the tip, and the camber angle decreases from approximately 29 degrees at the hub to approximately 12 degrees at the tip.

32. The method as recited in claim 20, comprising manufacturing a three-phase DC motor comprising a stator and a rotor comprising a rare earth magnet, and

wherein the stagger angle increases from approximately 29 degrees at the base region of the blade to approximately 56 degrees at the tip of the blade, and the camber angle decreases from approximately 29 degrees at the base region of the blade to approximately 12 degrees at the tip of the blade.

33. The cooling fan as recited in claim 25, wherein the motor is a three-phase DC motor comprising a stator and a rotor comprising a rare earth magnet, and

wherein the impeller comprises a hub and a plurality of blades each extending from the hub to a tip of the respective blade, wherein each blade has a stagger angle which increases from about 24 degrees to 30 degrees at the hub to about 50 degrees to 56 degrees at the tip, or each blade has a camber angle which decreases from about 26 degrees to 32 degrees at the hub to about 9 degrees to 15 degrees at the tip, or a combination thereof.

34. A cooling fan for an electronic device, comprising:

a three-phase DC motor comprising a stator and a rotor comprising a rare earth magnet;

an impeller comprising a hub to house the three-phase DC motor, and a plurality of blades each extending from the hub to a tip of the respective blade, wherein the impeller has an impeller diameter and each blade has a blade height that is at least 25 % of the impeller diameter;

a fan housing to house the impeller; and

a pair of finger guards secured to opposite sides of the fan housing, each finger guard being displaced outward relative to the fan housing, wherein the fan housing comprises a top that extends crosswise over the pair of finger guards and overhangs the flow path outside the pair of finger guards;

wherein each blade has a stagger angle which increases from about 24 degrees to 30 degrees at the hub to about 50 degrees to 56 degrees at the tip, or each blade has a camber angle which decreases from about 26 degrees to 32 degrees at the hub to about 9 degrees to 15 degrees at the tip, or a combination thereof.

9. **EVIDENCE APPENDIX**

None.

10. **RELATED PROCEEDINGS APPENDIX**

None.